US Army Corps of Engineers®

R&D Program: TOWNS

Work Unit: Cumulative Effects of Piping Erosion on Levees

Needs & Problems Addressed:

- No accepted theory or design procedure that identifies a failure mechanism for piping
- Insufficient guidance on reduced levee stability, need better understanding of soil mechanics involved in piping event

Objectives:

- Update USACE method of seepage analysis
- Provide new knowledge to promote innovative methods of monitoring levees during high-water events and mitigation of levee damage from piping

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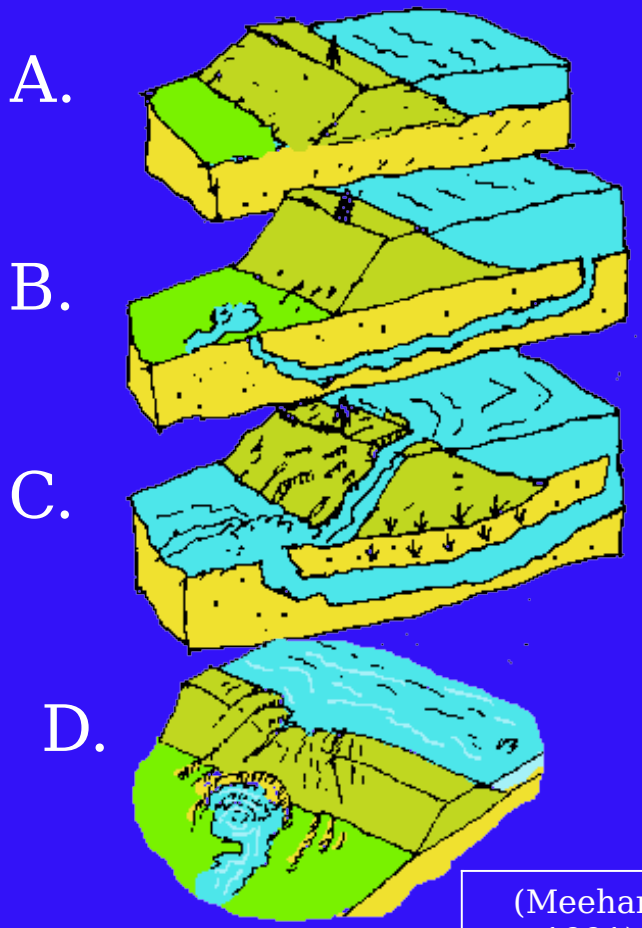
Work Unit Funding Profile:

FY03	FY04	FY05	Total
$ 250k	$180k	$ 75k	$505k

Comments on funding plan:

- Coordination with outside agencies to leverage physical tests
- Significant physical modeling involved



(Meehan, 1991)

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Business Program/Missions Areas Supported:

- Inland Navigation __ %
- Coastal Navigation __ %
- Coastal Storm Damage Reduction 20 %
- Inland Flood Control/Damage Reduction 80 %
- Environmental Protection & Quality __ %
- Multi-Purpose (Hydropower, Rec & Water Supply) __ %
- Emergency Management __ %
- Regulatory __ %
- Support for Others __ %

(Must to add to 100%) Total: 100 %

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CW Strategic Goals Check List: (check if applies)

- Provide sustainable water resources development & mgmt _X_
- Restore past environment degradation ___
- Provide project services of high quality _X_
- Reduce losses from natural & manmade hazards _X_
- Supports being a world class technical leader _X_
- Addresses strategic or system needs in a framework or integrated approach by developing:
  - Methods or decision support tools _X_
  - Technology to improve life cycle productivity _X_
  - Technology to monitor systems, provide feedback and develop operating guidance _X_

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Which “short term” field needs does this support:

- Improves efficiencies in O&M of Corps levees
- Enhances service live of projects
- Expedites decision-making for O&M and emergency operations
- Reduces life-cycle cost through better analysis of potential piping
- Increases public safety and reduce[illegible]g problems early

Field Review Group Relative Ranking:

- FRG planned for 21-22 AUG 02

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Listening Sessions Check List: (check if applies)

- Improves data sharing/exchange with the public in these areas:
  - Provides one stop shop for maps & data for basin wide planning ___
  - Provides data to make informed decisions _X_
  - Provides a system for basin wide planning _X_
  - Provides information about what is happening at Corps facilities _X_ (up to date web sites)
- Tech Transfer plan to include educating the public X
- Coordinate research, models, analysis with regulatory agencies to insure results will be accepted _X_
- Develop R&D products:
  - For watershed management plans, not just at the project level _X_
  - To include aesthetics as components of all projects ___
- Create better models for ground & surface water ___

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Products:

- Updated guidance on seepage analysis
- ArcView GIS geodatabase
- Reference Database on TOWNS website
- Publication of geomorphic maps and geologic profiles of the middle Mississippi River
- TR: Performance of Levee Underseepage Controls
- TR: Geotechnical Analysis of Levee Underseepage Using GIS and Statistical Applications
- TN: Preliminary physical testing results
- TL: River geomorphic study
- TR: Results of Physical Experiments on Piping under Levees
- TL: Influence of geology on seepage analyses
- User manual on ERDC-Levee GIS

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Benefits

- Direct:
  - Standardized method of collecting seepage data, improved USACE capability to map evolution and severity of piping in near real-time
  - High ROI

  Indirect:
  - Reduced property and life losses
  - New fundamental knowledge of piping phenomenon will promote innovative methods of monitoring levees
  - Provides risk reduction for public

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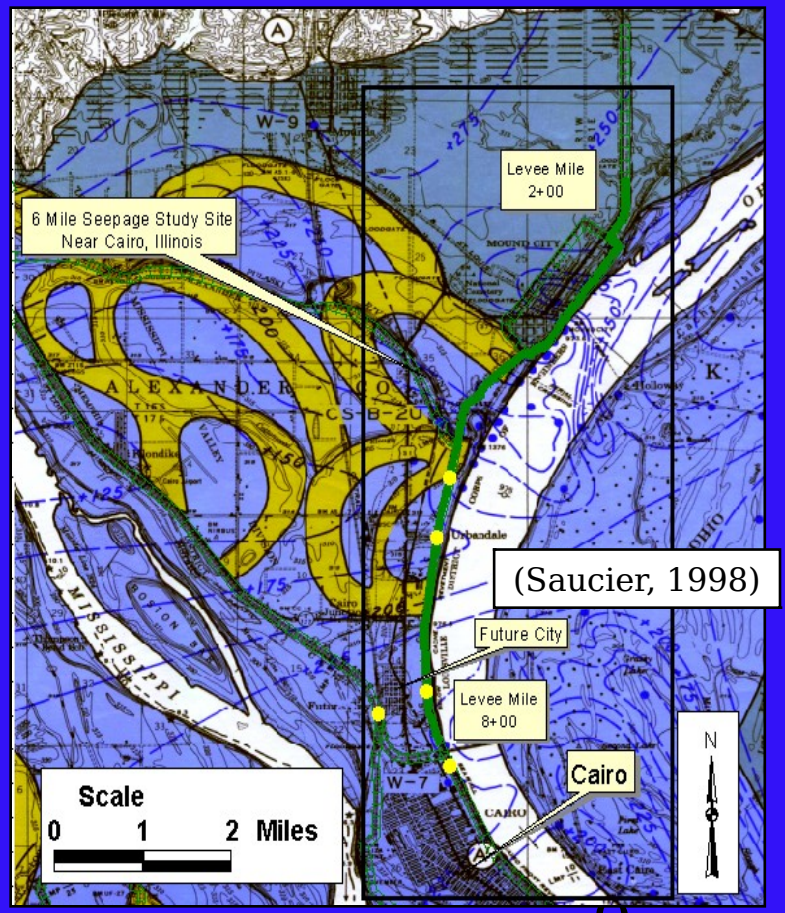
Technology Transfer Plan:

- GIS database for use with Levee Inspection Tool
- Annotated bibliography on piping
- Documentation of database
- Documentations of physical experiments
- Dissemination through TOWNS website
- Method peer review via conference and journal papers
- Training through PROSPECT courses



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Why should the Corps fund this R&D, instead of private industry and/or others:

- There is no incentive for private industry to perform basic research that results in improved analysis methods for Corps levees

What is Impact if not started:

- Without better knowledge of piping, catastrophic levee failures could occur with little warning